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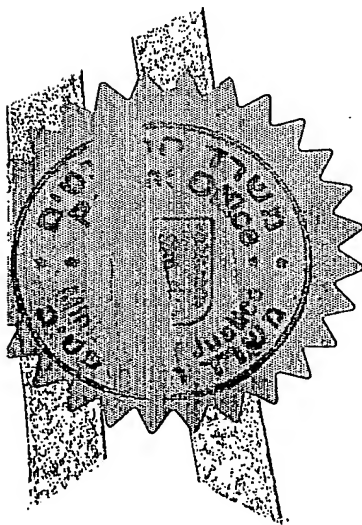
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**בקשה לפטנט**  
Application for Patent

(אני, (שם המבקש, מענו — ולגבי גוף מאוחד — מקום התאגדותו)  
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בעל אמצאה מכח  
of an invention, the title of which is:

התקן מלקחיים זעירים

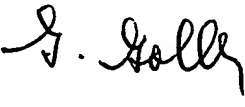
בעברית  
(Hebrew)

**A MICRO-FORCEPS DEVICE**

(באנגלית)  
English

Hereby apply for a patent to be granted to me in respect thereof.

מבקש בזאת כי ינתן לי עליה פטנט.

*בקשת חלוקה Application for Division		*דרישת דין קדימה Priority Claim		
*מבקשת פטנט from Application No. _____ Date _____ מיום		*מספר/סימן Number/Mark		
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*WOLFF, BREGMAN AND GOLLER P. O. Box 1352 Jerusalem, Israel, 91013				
*ת.ד. 1352 ירושלים 91013				
*חתימת המבקש Signature of Applicant				
*WOLFF, BREGMAN AND GOLLER by: 				

לשימוש הלשכה  
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FIGURE 1a

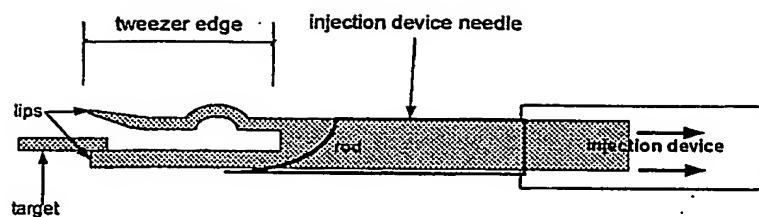


FIGURE 1b



**A MICRO-FORCEPS DEVICE**

**התקן מלקחיים זעירים**

The present invention relates to a micro-forceps device sized to grab, attach hold and/or manipulate and/or transport objects of small size (between 50 to 2900 microns on at least one of its dimensions).

The micro-forceps device according to the present invention preferably consists of a rod made of stainless steel or other suitable material. The rod may have a rectangular or circular cross section with a diameter of rod range from 0.5 to 3 mm. Two to ten mm from the edge of the rod is machined in order to form two lips (for example by machining and splitting edge as shown in Figures 1a and 1b, or by filing edge down and attaching an additional slab, stainless steel or other suitable material, to rod each having for example a semicircular or other cross section such that an opening resembling forceps is created between the two lips (forceps edge). The rod may be of any length varying from about 10 mm to several meters in length and it may contain slits or canals to allow for flow of liquid from or to forceps edges.

Thus according to the present invention there is provided a micro-forceps device for handling small objects comprising a rod having a diameter of between 0.5 and 3 mm and provided with a pair of displaceable spaced apart lips at one of the ends thereof.

Preferably said lips are displaceable between a first open position and a second closed position.

The micro-forceps device of the present invention is preferably designed and sized to be inserted into the lumen of a standard disposable surgical needle or any other tube or catheter or any injection device of internal lumen diameter slightly larger than the external diameter of the rod 75 to 3000 microns).

The term injection device as used herein is intended to denote a standard surgical needle connected to a syringe or any purposely made or commercially available catheter or other manually or automatically operated device.

In especially preferred embodiments of the present invention at least one of said lips is provided with an outwardly facing projection creating a cross-sectional area greater than the cross-sectional area of other sections of said rod whereby sliding engagement of said device into said lumen results in the lumen wall pressing against said projection and effecting the displacement of the lips from a first open position to a second closed position.

### Operation

The micro-forceps device is to be inserted into the injection device through needle, or otherwise mounted such that the rod is connected to injection device in a manner enabling to move the micro-forceps device forward and backwards within the injection device, for example by connecting the rod to the plunger of a standard surgical syringe, or manually from the other end of a catheter. When injection device is pushed forward (either with the plunger of the syringe or manually for example), forceps edge of the micro-forceps device is exposed and is protruding from injection device or catheter and thus tension between lips is released and lips are separated as in Figure 1a. The micro-forceps device is then positioned with both lips open surrounding the desired target. When the micro-forceps device is pulled backwards the forceps edge of the micro-forceps device is pulled into the lumen. As the lips are forced to close as they are pulled backwards, the forceps grip target as illustrated in Figure 1b. Both the micro-forceps device and the target are inserted inside the lumen where they can be transported to a site where it may be desirable to deposit the target. When the rod is pushed forwards again, the micro-forceps device is pushed forward, the lips return to the open position and the target is released.

The invention will now be described in connection with certain preferred embodiments with reference to the following illustrative Figures so that it may be more fully understood.

With specific reference now to the Figures in detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion

of the preferred embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the invention. In this regard, no attempt is made to show structural details of the invention in more detail than is necessary for a fundamental understanding of the invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the invention may be embodied in practice.

In the drawings:

Figures 1a and 1 b are cross-sectional views of the forceps according to the present invention in open and closed positions.

Referring now to the Figures in detail, Figure 1: (a) Forceps edge of rod is machined leaving two lips to resemble forceps, a lump on one of the lips is formed by twisting material appropriately, such that (b) when injection device plunger is retracted, the lump, when entering the needle forces forceps lips against each other thus enabling them to grip target. Elasticity of the material itself exerts retracting force to re-open forceps when plunger is pushed forward again

The examples given below are only as a way of exemplification and in no way are meant to restrict the many other applications of the device.

Example 1: The target can be an organ fragment preserving the original organ structure, of dimensions 300 microns by 4mm by 1mm. thus allowing convenient insertion of micro organ into injection device directly from culture medium while pumping along with the micro organ a small amount of medium. This will allow the micro organ to remain viable inside injection device until implanted into designated location.

Example 2: The target can be a mammalian oocyte for in vitro fertilization, that can be held firm with micro-forceps during sperm injection or nuclear transfer into the oocyte.

Example 3: The target can be a clump or cellular aggregate made of stem cells that may be genetically modified to be inserted into a defined position in the body through a catheter and or surgical needle.

Example 4: The target may also be any non biological object such as a micro circuit that needs to be grabed and /or transported and/or located from/to a specific position.

It will be evident to those skilled in the art that the invention is not limited to the details of the foregoing illustrative embodiments and that the present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.



**WHAT IS CLAIMED IS:**

1. A micro-forceps device for handling small objects comprising a rod having a diameter of between 0.5 and 3 mm and provided with a pair of displaceable spaced apart lips at one of the ends thereof.
2. A micro-forceps device according to claim 1 wherein said lips are displaceable between a first open position and a second closed position.
3. A micro-forceps device according to claim 1 sized to be inserted into the lumen of a standard disposable surgical needle, tube or catheter or any other injection device.
4. A micro-forceps device according to claim 3 wherein at least one of said lips is provided with an outwardly facing projection creating a cross-sectional area greater than the cross-sectional area of other sections of said rod whereby sliding engagement of said device into said lumen results in the lumen wall pressing against said projection and effecting the displacement of the lips from a first open position to a second closed position.
5. A micro-forceps device according to claim 1, substantially as described herein and with reference to the accompanying Figures.

For the Applicant

**WOLFF, BREGMAN AND GOLLER**

by:

*G. Goller*